

- 10017396-121801
1. A method of forming an insulator having a main component of silicon dioxide by a chemical vapor deposition method, wherein at least one kind of organic substance including benzene nucleuses is used as a benzene nucleus source so that said insulator includes said benzene nucleuses.
  2. The method as claimed in claim 1, wherein said benzene nucleus has a bonding structure with silicon atoms.
  3. The method as claimed in claim 2, wherein at least one selected from the group consisting of phenyltrimethylsilane and phenyltrimethoxysilane is used as said benzene nucleus source.
  4. The method as claimed in claim 2, wherein said organic substance as said benzene nucleus source is used together with a silicon source material.
  5. The method as claimed in claim 2, wherein said organic substance as said benzene nucleus source is used alone without any silicon source material.
  6. The method as claimed in claim 1, wherein said benzene nucleus is free of a bonding structure with silicon atoms and said organic substance as said benzene nucleus source is used together with a silicon source material.
  7. The method as claimed in claim 6, wherein said organic substance has a structure of a single benzene nucleus.
  8. The method as claimed in claim 7, wherein said organic substance comprises at least one selected from the group consisting of toluene, benzene and xylene.
  9. The method as claimed in claim 6, wherein said organic substance has a structure of a plurality of benzene nucleuses.
  10. The method as claimed in claim 9, wherein said organic substance comprises at

least one selected from the group consisting of naphthalene, biphenyl and anthracene.

11. The method as claimed in claim 1, wherein said chemical vapor deposition method is a plasma chemical vapor deposition method.

12. The method as claimed in claim 1, wherein said chemical vapor deposition method is a low pressure chemical vapor deposition method.

13. The method as claimed in claim 1, wherein after said insulator has been formed by said chemical vapor deposition method, then said benzene nucleuses are removed from said insulator thereby to form pores in said insulator.

14. The method as claimed in claim 13, wherein said benzene nucleuses are removed by causing an elimination reaction for eliminating benzene nucleuses from said insulator.

15. The method as claimed in claim 14, wherein said elimination reaction is caused by exposure to oxygen radicals generated in a plasma.

16. The method as claimed in claim 14, wherein said elimination reaction is caused by a heat treatment in a vacuum at a temperature of not less than 450°C.

17. The method as claimed in claim 14, wherein said elimination reaction is caused by a heat treatment in an inert gas atmosphere at a temperature of not less than 450°C.

18. The method as claimed in claim 13, wherein said benzene nucleuses are removed by causing a combustion reaction in an oxygen atmosphere.

19. The method as claimed in claim 1, wherein said chemical vapor deposition method is carried out by maintaining a temperature of not less than about 500°C so as to cause elimination reaction of said benzene nucleuses at the same time of deposition of said insulator, thereby to form said insulator including pores.

20. A method of forming an insulation film having a main component of silicon dioxide in a semiconductor device by a chemical vapor deposition method, wherein at least one kind of organic substance including benzene nucleuses is used as a benzene nucleus source so that said insulation film includes said benzene nucleuses.
21. The method as claimed in claim 20, wherein said benzene nucleus has a bonding structure with silicon atoms.
22. The method as claimed in claim 21, wherein at least one selected from the group consisting of phenyltrimethylsilane and phenyltrimethoxysilane is used as said benzene nucleus source.
23. The method as claimed in claim 21, wherein said organic substance as said benzene nucleus source is used together with a silicon source material.
24. The method as claimed in claim 22, wherein said organic substance as said benzene nucleus source is used alone without any silicon source material.
25. The method as claimed in claim 20, wherein said benzene nucleus is free of a bonding structure with silicon atoms and said organic substance as said benzene nucleus source is used together with a silicon source material.
26. The method as claimed in claim 25, wherein said organic substance has a structure of a single benzene nucleus.
27. The method as claimed in claim 26, wherein said organic substance comprises at least one selected from the group consisting of toluene, benzene and xylene.
28. The method as claimed in claim 25, wherein said organic substance has a structure of a plurality of benzene nucleuses.
29. The method as claimed in claim 28, wherein said organic substance comprises at

least one selected from the group consisting of naphthalene, biphenyl and anthracene.

30. The method as claimed in claim 20, wherein said chemical vapor deposition method is a plasma chemical vapor deposition method.

31. The method as claimed in claim 20, wherein said chemical vapor deposition method is a low pressure chemical vapor deposition method.

32. The method as claimed in claim 20, wherein after said insulation film has been formed by said chemical vapor deposition method, then said benzene nucleuses are removed from said insulation film thereby to form pores in said insulation film.

33. The method as claimed in claim 32, wherein said benzene nucleuses are removed by causing an elimination reaction for eliminating benzene nucleuses from said insulation film.

34. The method as claimed in claim 33, wherein said elimination reaction is caused by exposure to oxygen radicals generated in a plasma.

35. The method as claimed in claim 33, wherein said elimination reaction is caused by a heat treatment in a vacuum at a temperature of not less than 450°C.

36. The method as claimed in claim 33, wherein said elimination reaction is caused by a heat treatment in an inert gas atmosphere at a temperature of not less than 450°C.

37. The method as claimed in claim 32, wherein said benzene nucleuses are removed by causing a combustion reaction in an oxygen atmosphere.

38. The method as claimed in claim 20, wherein said chemical vapor deposition method is carried out by maintaining a temperature of not less than about 500°C so as to cause elimination reaction of said benzene nucleuses at the same time of deposition of said insulation film, thereby to form said insulation film including pores.